
VALIDATION OPINION FOR REVISION OF REGISTERED MONITORING PLAN

Hidroelectrica La Confluencia S.A

**Project for the reduction of greenhouse gas
emissions of Hidroelectrica La Confluencia
S.A**

UNFCCC Ref. No. 4229

SGS Climate Change Programme

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Abbreviations

BM	Build margin
CM	Combined margin
CAR	Corrective action request
CDEC	Economical Centre of Load Dispatch
CDM	Clean development mechanism
CER	Certified emission reduction
CL	Clarification request
CNE	National Commission of Energy (acronym from the Spanish "Comisión Nacional de Energía")
DOE	Designated operational entity
DNA	Designated national authority
EF	Emission factor
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward action request
GCV	Gross calorific value
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
HLC	La Confluencia Hydroelectric power plant (acronym from the Spanish "Hidroelectrica La Confluencia")
HLH	La Higuera Hydroelectric power plant (acronym from the Spanish "Hidroelectrica La Higuera")
OM	Operating margin
PDD	Project Design Document
PP	Project Participant
NCV	Net calorific value
SIC	Central Interconnected System
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual

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1. Validation Opinion

Paragraph 57 of the modalities and procedures for the CDM allows project participants to revise monitoring plans in order to improve accuracy and/or completeness of information, subject to the revision being validated by a Designated Operational Entity.

SGS United Kingdom Ltd has been contracted by Hidroelectrica La Confluencia S.A. to perform such a validation of the revision of monitoring plan according to the procedure detailed in Annex 28 to EB 49 meeting report; the registered monitoring plan is part of the PDD of registered CDM "Project for the reduction of greenhouse gas emissions of Hidroelectrica La Confluencia S.A.", UN number 4229. The purpose of a validation is to have an independent third party assessment of the revision of monitoring plan. In particular, the level of accuracy and/or completeness in the proposed revision of the monitoring plan, and the conformity with approved monitoring methodology applicable to the project activity.

The changes introduced to the monitoring plan are divided in three issues: 1). To define the calculation procedure to obtain EGy based on the set of measurements done by the relevant meters and to deduct in future the electricity generated by other power plants that are been built (by other investors) and will inject its energy to the grid through the same sub-station (Tinguiririca) than the project; 2). To remove a parameter that is not required for projects with power density over 10W/m²; and 3). To include project emissions originated by the diesel consumption in emergency generators.

Based on the assessment carried out it was validated that the changes do not threaten the performance of the monitoring and that a conservative approach was followed. Thus this revision improves the accuracy of information provided and consistency in the registered PDD and the monitoring plan.

Furthermore, we confirm that:

(a) the proposed revision points have been described, and an assessment has been provided to substantiate the reasons for each of the proposed revision points of the registered monitoring plan, using objective evidence;

(b) the proposed revision of the monitoring plan ensures that the level of accuracy or completeness in the monitoring and verification process is not reduced as a result of the revisions;

(c) the proposed revision of the monitoring plan is in accordance with the approved monitoring methodology applicable to the project activity whilst ensuring the conservativeness of the emission reductions calculation;

(d) the project activity is undergoing first verification.

Signed on Behalf of the Validation Body by Authorized Signatory



Signature:

Name: Siddharth Yadav

Date: 26-04-2012

2. Introduction

2.1 Objective

Paragraph 57 of the modalities and procedures for the CDM allows project participants to revise monitoring plans in order to improve accuracy and/or completeness of information, subject to the revision being validated by a Designated Operational Entity.

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The Validation was performed in accordance with the UNFCCC criteria for the Clean Development Mechanism (CDM) and the host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

SGS reviewed the project design documentation (revised monitoring plan), using a risk based approach and conducted follow-up interviews.

2.2 Scope

The scope of the validation is defined as an independent and objective review of revision of monitoring plan. The information in these documents is reviewed against the Kyoto Protocol requirements, the UNFCCC rules and associated interpretations.

The validation is not meant to provide any consulting towards the Client/the project. However, SGS may issue requests for clarifications and/or corrective actions which may provide input for improvement of the project design.

2.3 GHG Project Description

Refer to <http://cdm.unfccc.int/Projects/DB/DNV-CUK1292224222.4/view>, the project web page. There is no change in the project activity description. The project was registered on 02/02/2011 under UNFCCC ref. no. 4229.

3. Methodology

3.1 Review of CDM-PDD and Additional Documentation

The validation is performed primarily as a document review of the publicly available project documents. The assessment is performed by trained assessors using a validation protocol.

A site visit (the same performed in MP1 on 15&16/12/2011) was carried out to verify assumptions in the baseline.

3.2 Use of the Validation Protocol

The validation protocol used for the assessment is partly based on the templates of the CDM Validation and Verification Manual version 1.2 (EB55 Annex.1):

- it organises, details and clarifies the requirements the project is expected to meet; and
- it documents both how a particular requirement has been validated and the result of the validation.

The validation protocol consists of several tables. The different columns in these tables are described below.

Checklist Question	Ref ID	Means of Verification (MoV)	Comment	Draft and/or Final Conclusion
The various requirements are linked to checklist questions the project should meet.	Lists any references and sources used in the validation process. Full details are provided in the table at the bottom of the checklist.	Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.	The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.	This is either acceptable based on evidence provided (Y/OK), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). A Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

The validation protocol is attached with the report as Annex 1.

3.3 Findings

As an outcome of the validation process, the team can raise different types of findings

In general, where insufficient or inaccurate information is available and clarification or new information is required the Assessor shall raise a **Clarification Request (CL)** specifying what additional information is required.

Where a non-conformance arises the Assessor shall raise a **Corrective Action Request (CAR)**. A CAR is issued, where:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A Forward Action Request (FAR) is raised during verification for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

The validation process may be halted until this information has been made available to the assessors' satisfaction. Failure to address a CL/FAR may result in a CAR. Information or clarifications provided as a result of a CL/FAR may also lead to a CAR.

Corrective Action Requests, Clarification Requests and Forward Action Requests are raised in the draft validation protocol and detailed in a separate form (Findings Overview). In this form, the Project Developer is given the opportunity to address and "close" outstanding CARs and respond to CLs and FARs. The detailed Finding Overview is attached with this document as Annex 2.

3.4 Internal Quality Control

Following the completion of the assessment process and a recommendation by the Assessment team, all documentation will be forwarded to a Technical Reviewer. The task of the Technical Reviewer is to check that all procedures have been followed and all conclusions are justified. The Technical Reviewer will either accept or reject the recommendation made by the assessment team.

4. Validation Findings

4.1 Application of Monitoring Methodology and Monitoring Plan

Type of Revision

The revision of monitoring plan is a result of a recommendation by the PP/DOE as mentioned in section A.1 of the Annex–1 - Validation Protocol below.

The changes in the monitoring plan originated because:

1. the monitoring plan available in the registered PDD (ref 7) did not report the equation to obtain the electricity generated by the project, additionally it did not consider that electricity would be injected by other plants (in construction) to the grid through the same sub-station that the project does.
2. the monitoring plan available in the registered PDD (ref 7) includes a parameter that does not have to be monitored for projects as La Confluencia (with power density over 10W/m²).
3. the registered PDD did not consider the emissions due to the diesel consumption of the emergency generators.

The proposed revision of the monitoring plan ensures that the level of accuracy and completeness in the monitoring and verification process is not reduced as a result of the revisions (details below).

As stated previously the changes in the monitoring plan can be classified into three main items. They were reviewed and validated as described below:

1. To define the calculation procedure to obtain $EG_{PJ,y}$ based on the set of measurements done by the relevant meters and deduct, in future, the electricity generated by other power plants that are been built (by other investors) and will inject its energy to the grid through the same sub-station (Tinguiririca) than the project does.

As per ACM002 version 12.1 (ref 3) and the registered PDD (ref 7) the parameter $EG_{PJ,y} = EG_{facility,y}$ has to be obtained from the project activity site through continuous measurement. As per MR (ref 6a) received as part of the first verification, $EG_{facility,y}$ is calculated using an equation (ref 6a), which is based on continuous measurement. The cited equation is not included in the monitoring plan (PDD section B.7.1, ref 1).

Additionally it was found that the information about meters reported in the PDD Annex 4 (ref 7) is not consistent with the monitoring report (ref 6a) and the meters installed on site. Annex 4 of the PDD mentions only M5 while Monitoring Report lists two meters (M5 & M6 in parallel) that record the net injections of La Confluencia (PA UN 4229) and La Higuera (PA UN 248) in the connection point, which is correct against the equipment installed on site. It is to be noted that the PA La Higuera (UN 248) presented for UN approval “

Changes to the PDD” was included the analogous deduction of La Confluencia at the injection point.

Based on the described situation PP completed the monitoring information of parameter EG_y in the revised monitoring plan (section B.7.1 and annex 4). The RMP informs that the parameter will be obtained from measurement taken by a set of energy meters. During the site visit it was verified that close to HLC and HLH new power plants are beeing built by other investors. It was verified that there are two power plants (San Andres and El Paso) located upstream, the cited power plants have approved the EIA (ref 14&15) and belong to “HydroChile S.A.”.

According to information from the PP the new power plants will inject their energy to the grid through Tinguiririca substation (please see RMP, section.7.2, figure 9), for this reason the PP proposes two procedures (A & B) to obtain $EG_{PJ,y}$. The “Procedure A” will be applicable in the case that no new plants inject their energy through Tinguiririca sub-station, while Procedure B will be applicable when the new power plants enter into operations. Both procedures were assessed considering the diagram of the monitoring points illustrate in Figure 9 (section B.7.2). Based on the situation, it is deemed correct to present a calculation procedure for each scenario (named Procedure A & Procedure B).

For procedure A, $EG_{\text{facility},y}$ will be calculated as equation 1 (below) of RMP section B.7.1, which is deemed correct.

$$\text{Energy}_{\text{invoicing}}_{\text{HLC}} = EG_{\text{facility},y} = (M5 + M6) \cdot \frac{(M7 + M8)}{(M3 + M4) + (M7 + M8)}$$

Where:

M3+M4 : net electricity generated by La Higuera measured at La Higuera Substation.

M5+M6: net electricity injected to the grid by La Higuera and La Confluencia

M7+M8: net electricity generated by the project measured at La Higuera Substation.

The formula proposed by the PP is deemed correct because it considers the measurements of the electricity injected to the grid in the connection point (Tinguiririca substation, M5+M6). Given that M5+M6 includes the generation of La Higuera and La Confluencia, it is multiplied by the ratio $((M7+M8)/(M3+M4)+(M7+M8))$ that corresponds to the fraction of the electricity generated by La Confluencia. The multiplicative factor is correct as well because the electricity measurements (of La Higuera and La Confluencia) are taken at the same point, thus are excluded from the potential differences by losses.

During the site visit it was verified that all the meters involved in Procedure A are duly installed.

For procedure B, $EG_{\text{facility},y}$ will be obtained as equation 2 (below) of RMP section B.7.1, which is deemed correct.

$$EG_{\text{facility},y} = (M5 + M6) \cdot \frac{(M7 + M8) \cdot \frac{(M9 + M10)}{(M9 + M10) + (M11 + M12)}}{(M3 + M4) + (M7 + M8)}$$

Where:

M3+M4 : net electricity generated by La Higuera measured at La Higuera Substation.

M5+M6: net electricity injected to the grid by La Higuera and La Confluencia, and other plants installed upstream La confluencia substation.

M7+M8: net electricity generated by the project measured at La Higuera Substation.

M9+M10: net electricity generated by the project measured at La Confluencia Substation.

M11+M12: net electricity generated new projects located upstream measured at La Confluencia Substation.

The formula proposed by the PP is deemed correct because it considers the measurements of the electricity injected to the grid in the connection point (Tinguiririca substation, M5+M6). Given that M5+M6 includes the generation of La Higuera, La Confluencia and the new plants, it is multiplied by the ratio $((M7+M8)/(M3+M4)+(M7+M8))$ that corresponds to the fraction of the electricity generated by La Confluencia and the new power plants upstream. Similarly the ratio $((M9+M10)/(M9+M10)+(M11+M12))$ corresponds to the fraction of the electricity generated by La Confluencia and left aside the generation of the new power plants.

The multiplicative factors are correct as well because the electricity measurements are taken at the same point, thus are excluded from the potential differences by transmission losses.

The procedures (A&B) proposed by the PP do not reduce the completeness of the monitoring because additional measurements will be monitored on site in order to obtain the net energy injected to the grid by the project. Thus all the information to obtain the parameter $EG_{\text{facility},y}$ will be obtained from measurements. Regarding the accuracy of the information, During the site visit it was verified that M9, M10, M11 & M12 are not installed yet. However as per RMP the new meters will have the same accuracy class (0.2s) than the meters already installed. It was validated that all meters (involved in Procedures A&B) are identified in the RMP section B.7.1

It was validated as well that a special procedure in case of failure of the meters located in the injection point (M5+M6) was defined in the RMP (ref 1e). As per RMP (ref 1e) in such cases the measurement taken in La Higuera sub-substation (M7+M8) will be used and the historical losses from La Higuera until Tinguiririca will be deducted.

As per the RMP the losses will be obtained as per equation 3, which is deemed correct.

$$tl_{HLCavg} = AVG \left\{ \frac{(M3 + M4) + (M7 + M8) - (M5 + M6)}{(M3 + M4) + (M7 + M8)} \right\}$$

It was validated over a period of 2 years of historical data (latest available) will be used to determine the line losses in case that this procedure has to be applied. It is considered suitable, since this period is long enough to include the effect of the differences in the environmental temperature and its impact over the losses (ref 35).

Since the project has considered the procedures (A&B) to obtain $EG_{facility,y}$ (depending on the implementation of the new power plants), the same distinction has to be done for the procedure in case of failure. Thus in case the new plants are not operative (procedure A) $EG_{facility,y}$ will be obtained through equation 4 ($EG_{facility,y} = (M7+M8) \cdot (1 - tl_{HLC,avg})$) of the RMP (ref 1e). It is deemed correct, because M7+M8 only records the net electricity generated by the project (La Confluencia) in La Higuera sub-station and the factor $(1 - tl_{HLC,avg})$ allows it to deduct the losses from this sub-station until the injection point (Tinguririca sub-station).

Similarly the procedure in the event of the failure of M5+M6 while the new power plants are in operation was assessed. Under these circumstances $EG_{facility,y}$ will be obtained as per equation 5 of the RMP (ref 1e).

$$EG_{facility,y} = (M7 + M8) \cdot \frac{(M9 + M10)}{(M9 + M10) + (M11 + M12)} \cdot (1 - tl_{HLCavg})$$

The previous equation is deemed correct, because it considers the amount of net energy injected by the project in La Higuera sub-station, which corresponds to M7+M8 times the ratio $((M9+M10)/(M9+M10)+(M11+M12))$ that deducts the generation of the new power plants. Later, as in the previous case the factor $(1 - tl_{HLC,avg})$ allows the deduction of the losses from this sub-station until the injection point (Tinguririca sub-station).

Therefore, the RMP provides the proper action to obtain $EG_{facility,y}$ under normal circumstances as in meters (M5+M6) failing.

Regarding monitoring conditions, the methodology requires “continuous measurement and at least monthly recording”, this is correctly defined in the RMP which is the same compared to the registered monitoring plan.

Regarding the meters accuracy, the registered PDD (ref 1), section B.7.1, & Annex 4, states that as per “Normas Técnicas” the maximum permissible error of the meters is 0.2%. It was verified that as per the local regulation (ref 10, article 4-7), the meters have to be of class 2, which means 2% of error. Thus the registered PDD reports incorrectly the local regulation requirements. It was validated that the RMP, corrected the information and additionally includes the requirement of Manual of Procedures for Metering Systems (ref 28). The information is deemed correct and the energy meters comply with the regulation. It is important to note that this correction does not have any impact over the accuracy of the monitoring plan because as it is stated in the RMP that all the meters involved will be class 0.2s, which is more accurate at low currents than class 0.2, the one committed in the registered PDD (ref 7). As per the catalogue of the meters (ref. 11 (Jemstar), ref 33 (Ion)), they comply with IEC 687 (ie. Class 0.2s). Additionally for those installed meters, it was validated against the certificates (ref 16) issued by CAM (third party) that the meters are in compliance with IEC 62053-22 (applicable for meters class 0.2s) & IEC 62053-23 (applicable for meters class 0.2). Lastly it was verified that the meters accuracy (class 0.2s) complies with the local regulation “Technical Norm of quality and security of the service” issued by the CNE (ref 19, article 4-7) that requires class 2, thus the meters installed on site over comply the regulation requirement.

Regarding the electricity meters operation, as per the registered PDD (ref 1), annex 4, the PP committed the verification of the meters at least every two years. This issue remains the same in the RMP.

During the site visit and according with the meters certificates (ref 16), the project has two types of brands for its meters, “ION” whose provider is Schneider Electric and “Jemstar” whose provider is Ametek. According with the letter issued by Schneider Electric (ref 20), the meters do not need calibration, but it is recommended that calibration be verified every seven years. Similarly, based on the technical sheet (ref 21) of Ametek, the

provider recommends the verification of the calibrated accuracy every four years. Thus it was validated that the procedure defined by the PP regarding meters maintenance (ref 35) is suitable and conservative and in compliance with EB 52 annex 60. The PP will verify the meters every two years. In the same line RMP states that the meters will be verified every two years and in the case of measurement problems, the equipments will be repaired/replaced, the information is consistent with the internal procedure defined by the PP (ref 28) to ensure the correct operation of the meters.

Finally, in order to ensure the quality of EG_{PJ} , the data will be crosschecked against records from CDEC-SIC who is the grid operator. The procedure is the same as the registered monitoring plan.

2. To remove a parameter that is not required for projects with power density over $10W/m^2$.

The parameter T_{EGy} was included in the registered PDD (ref 7), but it was eliminated in the RMP. The action is deemed correct because as per the validation report (ref 2) the power density of the plant is $1,161.6 W/m^2$, thus as per ACM0002 version 12.1 T_{EGy} does not have to be monitored.

It is worth mentioning, that as per the PDD (ref 7) and the CNE records (ref 25), the project classifies as a "run of river" project, thus the concept of reservoir is not applicable to HLH. PDD reports that the project has an " hourly regulation pondage of 1.2 million m^3 live storage capacity, which is consistent with the classification of the project (by the CNE) and the validation report (ref 2).

As per PDD (ref 7) and as per the information verified on site (ref 13, pics 2.1 & 2.2), the installed capacity of the project is 163.22 MW. It was validated against the accumulation tank design sheet (ref 29) that the maximum inundated area is $140,512 m^2$. Thus the power density is $1,161 W/m^2$, then the project does not have to monitor the parameter T_{EGy} and was correctly deleted from the monitoring plan.

3. To include project emissions originated by the diesel consumption in emergency generators.

During the site visit it was found that the project has 4 stationary diesel emergency generators and 1 mobile generator, that is used for HLC and HLH. The project emissions originated from the diesel engine consumption was not included in the registered PDD (ref 7).

As per VVM 1.2, footnote 78, the emissions due to the diesel consumption has to be addressed. For this reason the PP following the "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (ref 12) and ACM0002 version 12.1 (ref 3) includes the following parameters in the RMP section B.7.1.:

- **$FC_{i,j,y}$** : the parameter is included in the revised monitoring plan (ref 1c) as $FC_{gen-set,i,y}$. The description and the units are consistent with the Tool (ref 12). As per the Tool (ref 12) the parameter should be monitored continuously, however as per revised MP (ref 1d), the parameter will be obtained using the following equation:

$$FC_{gen-set,i,y} = \text{Hours of operation of gen-set } i \text{ in year } y * \text{specific diesel consumption at full load of gen-set } i$$

Even though the Tool (ref 12) requires measuring the parameter, the PP proposes to calculate it using a conservative approach because the maximum specific consumption will be used. Additionally considering that the generators will operate only in emergency cases and periodically as part of the operation checking, the emissions expected by the diesel consumption are less than 1% of the ER. As it is reported later, at the site visit time the generators had operated no more than 80 hours since the project commissioning. According with the PE calculations performed by the PP (ref 8c), until September 2011 the equivalent CO₂ emissions were 37 tCO₂. Thus having validated that the project emissions linked to the emergency generators is less than 1% of the ER, it is deemed that the procedure defined to obtain $FC_{i,j,y}$: does not reduce the completeness and accuracy of monitoring and verification.

As per RMP, section B.7.1. (ref 1d) the following specifics consumption per emergency generator are reported:

Location	Brand	Model	Installed capacity	Yield
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			Serial number	Ref.	Lt/hour	Assessment
La Confluencia power house	Stemac generator sets	PA1888	1022585	Ref. 13, pic 1.4	188.7	Ok, ref. 31.
Portillo intake	FG Wilson Ltd	P150E2	FGWPEP10AGRB00981	Ref. 13, pic 1.1	33.2	Ok, ref 24
Tinguiririca intake	FG Wilson Ltd	P150E2	FGWPEP10LGRB00982	Ref. 13, pic 1.3	33.2	Ok, ref 24
Azufre intake	FG Wilson Ltd	P150E2	FGWPEP10LGRB00979	Ref. 13, pic 1.2	33.2	Ok, ref 24
Mobile gen set	Olympian	GEP22-4	OLY00000KD4J04648	Ref. 58, pic 37	14	Ok, ref 23

The specific consumption of each type of generator was compared with the technical sheet. The fuel consumption per each type of generator was assessed against the corresponding technical sheets (ref 23, 24 & 31).

As per PDD and project implementation, La Confluencia has seven water intakes. Three of them (Portillo, Tinguiririca and Azufre) have implemented emergency generators (as it was detailed in the previous table), while the other four intakes (Los Humos, Riquelme, La Gloria and Ciruelo) have not. As per the PP' s confirmation these intakes are not going to have emergency generators and could be served with the mobile generator (last in the previous table), these emissions are already included in the RMP. During the site visit it was verified as well that the project has implemented lines to supply the main intakes, and the PP confirmed that every intake will be connected to an energized line, thus they can operate with energy from the net in case of an emergency as well. This energy is accounted by the meters (bidirectional) as consume.

Therefore based on the validated information, the information included in the RMP regarding the emergency diesel generators is deemed complete.

- $T_{\text{gen-set},i,y}$: In order to calculate the fuel consumption the operation hours will be used. As per section B.7.1 (ref 1d), the parameter will be recorded monthly and will be obtained from the generator hour meter. During the site visit, it was verified that every generator keeps a record of the operation hours, thus the procedure defined by the PP to gather the information is deemed correct.
- $EF_{\text{CO}_2,\text{diesel}}$ & NCV_{diesel} : As per section B.7.1. both parameters will be obtained from IPCC. The value at the upper limit of the 95% confidence level will be used, it is deemed correct because the parameter will be part of the project emissions calculations, thus the criteria is conservative.

The diesel consumed by the mobile generator will be fully considered for the project emission of this project activity and for “ La Higuera Hydroelectric Project, Chile” (UN 0248)

The proposed revision of the monitoring plan is in accordance with the approved monitoring methodology applicable to the project activity (details below).

The project activity is using the methodology ACM0002 version 12.1 (ref 3) and “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” (ref 12), therefore the RMP was assessed against the cited methodologies.

The first modification is in line with the applied methodology ACM0002 version 12.1, because the change consider all the relevant meters and allow to obtain the value of the net energy injected by the project to the grid. The whole set of meters identified by the PP in the RMP, figure 9, allow to measure the project generation correctly in different points. This change means an additional step in the ER calculations, but it is necessary to consider only the project generation. This change does not decrease the accuracy of the

monitoring plan. Additionally it was verified that the data to obtain the energy injection of the project to the grid will be monitored as per the frequency required for the methodology, similarly the parameter EGPJ,y will be compared with the grid operator (CDEC-SIC) records.

The second modification does not have any impact over the project calculation, because the deleted parameter is not required in the calculation procedures and additionally as per ACM0002 version 12.1. its monitoring is not required for this project.

The third modification was required following the principles of completeness and conservativeness. The change has an impact over the ER calculation procedure because a new source of project emission has been considered. However this change affects the ER calculation in a conservative way, because diesel emissions are not considered in the baseline emissions but will be included as project emission increases, therefore the ER decreases.

The project was implemented according the information established in the PDD. However the PDD did not mention meter M6 (installed in Tinguiririca sub-station), thus information about the meters involved in the project monitoring was completed in the RMP.

This revision of the monitoring plan improves the accuracy of information provided and consistency in registered PDD and the monitoring plan. This revised monitoring plan will apply from the first periodic verification onwards.

4.2 Findings of Previous Verification Reports

The project is under its first verification; therefore this section is not applicable.

5. List of Persons Interviewed

Date of site visit	Name	Position	Short description of subject discussed
15/12/2012	Francisco Martinez	Manager Environment and Community Issues	<ul style="list-style-type: none"> - Data collection - Recording system - Data management (plant records) - Data corroboration (archiving systems) - ER calculations - Security & emergency procedures
	Carolina Videla	CDM Coordinator	
	Cristian Sandoval	Commercial Engineer	
	George Suazo	Plant controller	
	Mauricio Vargas	Plant operator	
	Roberto Leiva	SN Power	- No specific issue
16/12/2012	Vinka Hildebrant	SN Power, CDM manager	- Recording system

6. Document References

Category 1 Documents (documents provided by the Client that relate directly to the GHG components of the project, (i.e. the CDM Project Design Document, confirmation by the host Party on contribution to sustainable development and written approval of voluntary participation from the designated national authority):

- /1/ *Revised Monitoring Plan*
- /1a/ *Revised Monitoring Plan, 30/01/2012*
- /1b/ *Revised Monitoring Plan, 05/04/2012*
- /1c/ *Revised Monitoring Plan, 07/04/2012*
- /1d/ *Revised Monitoring Plan, 10/04/2012*
- /1e/ *Revised Monitoring Plan, 17/04/2012*
- /1f/ *Revised Monitoring Plan, 23/04/2012*

Category 2 Documents (background documents used to check project assumptions and confirm the validity of information given in the Category 1 documents and in validation interviews):

- /2/ *Validation Report, 20/01/2011*
- /3/ *ACM0002 version 12.1*
- /4/ *Tool to calculate the emission factor for an electricity system, version 2*
- /5/ *Validation and Verification Manual, version 1.2.*
- /6/ *Monitoring Report*
- /7/ *Registered PDD, 01/11/2010*
- /8/ *Emissions due to diesel emergency generators*
- /8b/ *Emissions due to diesel emergency generators, updated 05/04/2012*
- /8c/ *Emissions due to diesel emergency generators, updated 07/04/2012*
- /9/ *List of diesel emergency generators*
- /10/ *Jemstar meters catalogue, Spanish version*
- /11/ *Jemstar meters catalogue,*
- /12/ *Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion*
- /13/ *Pictures from the site visit*
- /14/ *EIA of El Paso*
- /15/ *EIA of San Andres*
- /16/ *List of meters and certificates*
- /17/ *Schneider electric letter*
- /18/ *Resolution 1607 - SEC*
- /19/ *Technical norm about meters*
- /20/ *Schneider electric letter*
- /20a/ *Mail containing Schneider electric letter*
- /21/ *JemStar meter technical sheet*
- /21a/ *Mail containing JemStar meter technical sheet*
- /22/ *DFLN 4, General law of electrical services*
- /23/ *Olympian generator technical sheet*
- /24/ *FG Wilson generator technical sheet*
- /25/ *Generation installed capacity per system, CNE*
- /26/ *ER spreadsheet for MP1*
- /27/ *Manual of Procedures for Metering systems and supervision systems in the CDEC-SIC*
- /28/ *Maintenance and Verification of Meters Procedure*
- /29/ *Accumulation tank design sheet*
- /30/ *Stemac generator technical data sheet*
- /31/ *Stemac generator technical data sheet, retrieved from <http://catalogo.stemac.com.br/conteudo/Main.asp>*
- /32/ *Norm IEC 62053-22*
- /33/ *Schneider meters catalogue*
- /34/ *Jemstar meters catalogue*
- /35/ *Climatic factors and narrow scenarios that influence the dispatch, retrieved from <http://www.mch.cl/documentos/pdf/PERDIDAS%20ELECTRICAS.pdf>*



Annex 1: Validation Protocols

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
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Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
A.1. General Requirements <i>(Note that the sections A.1.1- A.1.4 may be completed after the other sections are completed)</i>				
A.1.1. Is the revision in the monitoring plan based on a decision by the CDM EB	EB49, Annex 29	DR	No. The revision of the monitoring plan is based on a decision from the PP/DOE (SGS).	No
A.1.2. Is the revision based on a decision by CDM EB but also additional revisions are proposed by the PP/DOE	EB49, Annex 29	DR	No. The revision of the monitoring plan is based on a decision from the PP/DOE (SGS).	No
A.1.3. Is the need for revision in monitoring plan spotted during the first monitoring period?	EB49, Annex 29 Project page on UNFCCC website	DR	<p>Yes, The need for revision of the monitoring plan was spotted during the first monitoring period.</p> <p>CAR # 1:</p> <p>1. As per ACM002 version 12.1, the parameter $EG_{PJ,y} = EG_{facility,y}$ has to be obtained from the project activity site through continuous measurement. As per MR (ref 6a), $EG_{facility,y}$ is calculated using the equation 1 (ref 6a), which is based on continuous measurements, the cited equation is not included in the monitoring plan (PDD section B.7.1, ref 1). Additionally it was found that the information about meters reported in PDD annex 4 (ref 7) is not consistent with the monitoring report (ref 6a), PDD, Annex 4 mentions only M5 while Monitoring Report informs two meters (M5 & M6) that record the net injections of La Confluencia and La Higuera in the connection point.</p> <p>In order to correct the monitoring plan the PP should present a Revised Monitoring Plan for approval.</p> <p>2. PDD, section B.7.1, & Annex 4 (ref 1) and MR (ref 6a) state that as per “Normas Técnicas” the maximum permissible error of the meters is 0.2%. It was verified that as per the local regulation (ref 10, article 4-7), the meters has to be class 2, it means 2% of error. Thus the PDD and MR reports incorrectly the local regulation requirement. Since a RMP has to be presented, this issue has to be corrected.</p> <p>1. The procedure A&B and its corresponding equations are deemed correct, because they allow to obtain the value of $EG_{facility,y}$ at the injection point (Tinguiririca substation) to the grid. It was validated that the procedure proposed by the PP allows deducting the energy generated by La Higuera power plant and by the new power plants (San Andres and El Paso). Additionally it is considered suitable, because if finally the new plant do not use the transmission lines available, the monitoring plan still will be useful. Closed.</p>	Yes

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
			<p>2. It was validated that RMP corrected the information regarding the accuracy class required by the Technical norm (ref 10). At the same time it was validated that the information was completed according with the Manual of Procedures for Metering Systems (ref 28). The information is deemed correct and the energy meters comply with the regulation. Closed.</p> <p>CAR 1 was closed.</p> <p>CAR # 2: The parameter TEGy, which is defined as a monitored parameter in PDD section B.7.1. (ref 7) was not taken into account in the verification. It was verified that updated MR (ref 6b) does not include the parameter TEGy, this is correct for those projects whose power density is higher than 10 W/m². As per validation report (ref 2) the power density is 1,161.6 W/m². During the site visit, it was validated that the installed capacity of the project is 163.22 MW (ref 13, pics 2.1 & 2.2). It was validated against the accumulation tank design sheet (ref 29) that the inundated area is 140,512 m². Thus the power density is 1,161 W/m², then the project does not have to monitor the parameter TEGy and was correctly deleted from the monitoring plan. CAR 2 was closed.</p> <p>CAR # 3: During the site visit it was found that the La Confluencia has 4 diesel emergency generators. The project emissions originated by the diesel engine consumption were not included in the registered PDD (ref 7). The generators located in Portillo and Azufre intake do not record operation hours, they are without use because still the cited intakes are not operative. The generator located in the Power house and Tinguiririca intake recorded 61 hrs and 79.2 hrs operation hours respectively. It was validated that RMP includes all the relevant information regarding the emergency generators and the parameters required for its monitoring of the emissions. CAR 3 was closed.</p> <p>Additionally, during the assessment of the RMP the following points were raised: CAR#4. To present a request for approval of the RMP, the sections of PDD that have to be provided are: B.7.1, B.7.2 and Annex4. PP was requested to provide the RMP in track changes considering only the mentioned section and include at the beginning of the document project name, UN project number version and date of the RMP. The updated RMP (ref 1b) includes only the relevant sections (B.7 and annex 4). CAR 4 was closed.</p>	

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
A.1.4. Is the revised monitoring plan complete and does the revised monitoring plan follow the registered PDD template?	Registered PDD	DR	The RMP has to include only sections B.7.1, B.7.2 and annex 4 of the PDD. CAR 4 was raised. The updated RMP (ref 1b) includes only the relevant sections (B.7 and annex 4). CAR 4 was closed.	
A.1.5. Has the revised monitoring plan submitted in track change mode for each of the revision point (issue)?	Revised monitoring plan	DR	The RMP (ref 1c) includes only the relevant section in track change mode.	
A.1.6. is there an objective evidence for each of the proposed revision point (issue)?			<p>Yes. The changes in the RMP were done because four reasons:</p> <p><u>1. The MP did not define the calculation procedure to obtain EGy based on the set of measurements done by the relevant set of meters.</u> As it was previously stated in A.1.3. CAR 1 was satisfactorily closed because the RMP (ref 1c) includes the involved calculations. .</p> <p><u>2. The MP included a parameter (TEGy) that was not required as per the methodology.</u> As it was previously stated in A.1.3. CAR 2 was satisfactorily closed because it was validated that this project complies the conditions to avoid monitoring the cited parameter.</p> <p><u>3. The MP did not include the project emissions originated by the diesel consumption in emergency generators.</u> As it was previously stated in A.1.3. CAR 3 was satisfactorily closed because the RMP (ref 1c) contains all the parameters to monitor the emissions due to the fuel consumption.</p>	
A.1.7. Does the revised monitoring plan also include the Annex 4?	Registered PDD	DR	Yes, the RMP includes Annex 4. It was used to include additional information of the monitoring.	Yes
A.1.8. Does the revised monitoring plan lead/associate to any kind of change in the project registered design?	Registered PDD & EB48 Annex 66-67	DR	The RMP (ref 1c) does not lead to have changes in the PDD. During the site visit it was verified that the project operates as it is described in the registered PDD.	No
A.2. Data and Parameters Monitored				

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
A.2.1. Does the revised monitoring plan in the PDD comply with the approved methodology provided for the collection and archiving of all relevant data necessary for estimation or measuring the emission reductions within the project boundary during the crediting period?	VVM Para. 91a/91d/121 Revised MP Section B.7 EB49, annex 2, para 9	DR	<p>The parameters contained in the RMP were reviewed and assessed against ACM0002 version 12.1 and the “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” version 2 as described below:</p> <p>ACM0002 version 12.1, list of monitored parameters:</p> <ul style="list-style-type: none"> - $W_{\text{steam},\text{CO}_2,y}$: Not included in registered PDD and RMP, it is deemed correct because this parameter is applicable only for geothermal power projects. - $W_{\text{steam},\text{CH}_4,y}$: Not included in registered PDD and RMP, it is deemed correct because this parameter is applicable only for geothermal power projects. - $M_{\text{steam},y}$: Not included in registered PDD and RMP, it is deemed correct because this parameter is applicable only for geothermal power projects. - $EG_{\text{facility},y}$: The parameter was included in registered PDD (ref7), however in order to complete the information, it was updated. The parameter was assessed as follow: <u>Units</u>: the parameter will be expressed in MWh/year the parameter description is consistent with the methodology requirement. <u>Source/ data handling</u>: the parameter will be obtained from measurement taken by energy meters. <p>It was validated that the RMP (ref 1a) includes all the meters involved and potentially involved with the monitoring. It was verified during the MP1 site visit, that currently the meters at La Confluencia Substation (M9, M10, M11, M12) are not installed. Only the meters in the power house were installed and in operation.</p> <p>As per PP information new power plant will be built upstream La Confluencia Substation. This will lead in the future to consider the new power plants in the obtation of $EG_{\text{facility},y}$. It was verified that there are two power plants (San Andres and El Paso) located upstream, the cited power plants have approved the EIA (ref 14&15) and belong to “HydroChile S.A.”.</p> <p>El paso linea de transmission: http://seia.sea.gob.cl/documentos/documento.php?idDocumento=4819298</p> <p>Considering the new power plants, the PP proposes two ways to obtain the parameter, Procedure A (ref 1a) for the period when the new power plants are not in operation and Procedure B for the period when the new power plants enter into operations. Both procedures were assessed considering the diagram of the monitoring points illustrate in Figure 9 (section B.7.2).</p> <p>During the site visit it was verified that Tinguiririca substation correspond to the injection point of the projects La Higuera and La Confluencia (both CDM projects) and as per the</p>	Yes

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
			<p>PP information potentially the same meters will account the energy of San Andrés and El Paso. For this reason nowadays the electricity generated by La Higuera has to be deducted, and in future when new power plants entered into operations that energy in the injection point will have to be deducted as well.</p> <p>Based on the situation, it is deemed correct to present a calculation procedure for each scenario (named Procedure A & Procedure B).</p> <p>For procedure A, equation 1 (below) is deemed correct.</p> $Energy_invoicing_HLC = EG_{facility,y} = (M5 + M6) \cdot \frac{(M7 + M8)}{(M3 + M4) + (M7 + M8)}$ <p>Where:</p> <p>M3+M4 : electricity generated by La Higuera measured at La Higuera Substation. M5+M6: electricity injected to the grid by La Higuera and La Confluencia M7+M8: electricity generated by the project measured at La Higuera Substation.</p> <p>The formula proposed by the PP is deemed correct because it considers the measurements of the electricity injected to the grid in the connection point (Tinguiririca substation, M5+M6). Given that M5+M6 includes the generation of La Higuera, La Confluencia and the potential new plants, it is multiplied by the ratio $((M7+M8)/(M3+M4)+(M7+M8))$ that corresponds to the fraction of the electricity generated by La Confluencia. The multiplicative factor is correct as well because the electricity measurements (of La Higuera and La Confluencia) taken in the same point, thus are excluded the potential differences by losses.</p> <p>For procedure B, equation 2 (below) is deemed correct.</p> $EG_{facility,y} = (M5 + M6) \cdot \frac{(M7 + M8) \cdot \frac{M9 + M10}{(M9 + M10) + (M11 + M12)}}{(M3 + M4) + (M7 + M8)}$ <p>M3+M4 : electricity generated by La Higuera measured at La Higuera Substation. M5+M6: electricity injected to the grid by La Higuera and La Confluencia, and other plants installed upstream La confluencia substation.</p>	

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
			<p>M7+M8: electricity generated by the project measured at La Higuera Substation. M9+M10: electricity generated by the project measured at La Confluencia Substation. M11+M12: electricity generated new projects located upstream measured at La Confluencia Substation.</p> <p>The formula proposed by the PP is deemed correct because it considers the measurements of the electricity injected to the grid in the connection point (Tinguiririca substation, M5+M6). Given that M5+M6 includes the generation of La Higuera and La Confluencia, it is multiplied by the ratio $((M7+M8)/(M3+M4)+(M7+M8)))$ that corresponds to the fraction of the electricity generated by La Confluencia and the new power plants upstream. Similarly the ratio $((M9+M10)/(M9+M10)+(M11+M12))$ corresponds to the fraction of the electricity generated by La Confluencia and left aside the generation of the new power plants. The multiplicative factors are correct as well because the electricity measurements (in La Higuera and La Confluencia Substations)) are taken in the same point, thus are excluded the potential differences by losses.</p> <p>Regarding monitoring conditions, the methodology requires “<i>continuous measurement and at least monthly recording</i>”, please note for each meter the RMP states “hourly measurement and monthly recording”. PP was requested to correct the text. Open. CAR 1. It was verified that the RMP, consider the correct monitoring frequency as per the methodology. Item Closed. CAR 1. <u>QA/QC:</u> The data will be obtained from a formal source; therefore the data risk is associated to the information transcription.</p> <p>PDD, section B.7.1, & Annex 4 (ref 1) and MR (ref 6a) state that as per “Normas Técnicas” the maximum permissible error of the meters is 0.2%. It was verified that as per the local regulation (ref 10, article 4-7), the meters has to be class 2, it means 2% of error. Thus the PDD and MR reports incorrectly the local regulation requirement. Since a RMP has to be presented, this issue has to be corrected. CAR 1 item 2 was raised.</p> <p>RMP, section B.7.2 (ref 1f) states that the accuracy class of all the meters is 0.2s. The class was verified against the catalogue of the meters (ref. 11 (Jemstar), ref 33 (Ion)), they comply with IEC 687 (ie. Class 0.2s).. Additionally it was verified that the meters accuracy (class 0.2s) complies with the local regulation “Technical Norm of quality and security of the service” issued by the CNE (ref 19, article 4-7) that requires class 2, thus</p>	

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
			<p>the meters installed on site over comply the regulation requirement. On the other hand even though the PDD and MR, wrongly stated that local regulation asked for a maximum error of 0.2% (equivalent to class 0.2), the correction introduced in B.7.1 does not threaten the measurement accuracy because the meter installed on site complies with the initial information (0.2%).</p> <p>It was validated that RMP (ref 1b) corrected the information regarding the accuracy class required by the Technical norm (ref 10). At the same time it was validated that the information was completed according with the Manual of Procedures for Metering Systems (ref 28). The information is deemed correct and the energy meters comply with the regulation. CAR 1 item 2 was closed.</p> <p>During the site visit and according with the meters certificates (ref 16), the project has two brand of meters "ION" whose provider is Scheneider Electric and "Jemstar" whose provider is Ametek According with the letter issued by Schneider Electric (ref 20), the meters do not need calibration, but it is recommended the verification of the calibration every seven years. Similarly, based on the technical sheet (ref 21) of Ametek, the provider recommends to verify the calibrated accuracy every four years. Thus it was validated that the procedure defined by the PP regarding meters maintenance (ref 35) is suitable and conservative and in compliance with EB 52 annex 60, the PP will verify the meter every two years. In the same line PDD version 5 (ref 1d), states that the meters will be verified every two years and in case of measurement problems, the equipments will be repaired/replaced.</p> <p>- EG_{PJ_Add,y}: Not included in registered PDD and RMP, it is deemed correct because this parameter is applicable only for wind, solar, wave or tidal power plant projects.</p> <p>- TEG_y: The parameter was included in registered PDD (ref 7), but it was eliminated from the RMP (CAR 2). The action it is deemed correct because as per the validation report (ref 2) the power density of the plant is 1,161.6 W/m². As per PDD (ref 7) and as per the information verified on site (ref 13, pics 2.1 & 2.2), the installed capacity of the project is 163.22 MW. Area information requested to the PP to be assessed. CAR 2 was raised.</p> <p>- EF_{grid,CM,y}: Not included in registered PDD and RMP, it is deemed correct because the PP correctly as per the Tool to calculate the emission factor for an electricity system</p>	

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
			<p>options selected the EF_{OM} and EF_{BM} fixed ex-ante, thus the EF_{CM} remains fixed during the crediting period. Accordingly the cited parameters (EF_{OM}, EF_{BM}, EF_{CM}) are included in registered PDD (ref 7), section B.6.2.. The determination of this option (ex-ante values) was validated during validation stage (ref.2).</p> <p>$PE_{FF,y}$: Not included in registered PDD and RMP. PP was requested to include this parameter in the RMP, because as per the site visit the project has diesel emergency generators on site. However they were not included in the monitoring plan. In RMP (ref 1a). CAR 3 was raised. PP includes the parameters to calculate $PE_{FF,y}$, but the parameter itself was omitted, this is considered correct because the parameter is not compulsory for hydro power plants. CAR 3 was closed.</p> <p>Cap_{PJ} & A_{PJ}: Not included in registered PDD and RMP, it is deemed correct because these parameters are for those projects that have a reservoir, while the project activity has an accumulation pond to regulate the flow. It was validated that the registered PDD (ref 1), section A.2., classifies the project as a “run of river”, and the same is acknowledged in the validation report (ref 2) page 30. Additionally it was validated against the CNE records (ref 25), that the project is classified as a “run-of river”. Then the parameters Cap_{PJ} & A_{PJ} are not required in the monitoring plan of the project.</p> <p><u>As per the “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” (ref 12) the following parameters have to be monitored:</u></p> <p>$FC_{i,j,y}$: the parameter is included in the revised monitoring plan (ref 1a) as $FC_{gen-set,i,y}$. The description and the units are consistent with the Tool (ref 12). As per the Tool (ref 12) the parameter should be monitored continuously, however as per revised MP (ref 1a), the parameter will be obtained using the following equation:</p> <p>$FC_{gen-set,i,y}$ = Hours of operation of gen-set i in year y * specific diesel consumption at full load of gen-set i</p> <p>Even though the Tool (ref 12) requires measuring the parameter the PP propose to calculate it using a conservative approach because the maximum specific consumption will be used. Additionally considering that the generators will operate only in emergency cases and periodically as part of the operation checking, the emissions expected by the</p>	

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs																																														
			<p>diesel consumption are less than 1% of the ER. As it is reported later, at the site visit time the generators had operated no more than 80 hours since the project commissioning. According with the PE calculations performed by the PP (ref 8), until September 2011 the equivalent CO2 emissions were 37 tCO₂. Thus having validated that the project emissions linked to the emergency generators is less than 1% of the ER, the procedure defined to obtain FC_{i,j,y}: is deemed correct.</p> <p>As per section B.7.1. (ref 1a) the following specifics consumption per emergency generator are reported:</p> <table><tr><th rowspan="2">Location</th><th rowspan="2">Brand</th><th rowspan="2">Model</th><th colspan="2">Installed capacity</th><th colspan="2">Yield</th></tr><tr><th>Serial number</th><th>Ref.</th><th>Lt/hour</th><th>Assessment</th></tr><tr><td>La Confluencia power house</td><td>Stemac generator sets</td><td>PA1888</td><td>1022585</td><td>Ref. 13, pic 1.4</td><td>188.7</td><td>Pending assessment</td></tr><tr><td>Portillo intake</td><td>FG Wilson Ltd</td><td>P150E2</td><td>FGWPEP10AGRB00981</td><td>Ref. 13, pic 1.1</td><td>31.2</td><td>As perf ref. 24 PP is requested to revise the value.</td></tr><tr><td>Tinguiririca intake</td><td>FG Wilson Ltd</td><td>P150E2</td><td>FGWPEP10LGRB00982</td><td>Ref. 13, pic 1.3</td><td>31.2</td><td>As perf ref. 24 PP is requested to revise the value.</td></tr><tr><td>Azufre intake</td><td>FG Wilson Ltd</td><td>P150E2</td><td>FGWPEP10LGRB00979</td><td>Ref. 13, pic 1.2</td><td>31.2</td><td>As perf ref. 24 PP is requested to revise the value.</td></tr><tr><td>Mobile gen set</td><td>Olympian</td><td>GEP22-4</td><td>OLY00000KD4J04648</td><td>Ref. 58, pic 37</td><td>14</td><td>Ok, ref 23</td></tr></table> <p>The specific consumption of each type of generator was compared with the technical sheet. It was found that fuel consumption for FG Wilson generators have to be revised. Since the technical sheet of the Stemac PA 1888 was not available, PP was requested to provide the supporting evidence. CAR 3, item 3 was raised. It was verified that the consumption of Wilson gen-set was corrected as per the technical sheet (ref 24). Similarly it was verified against the information published by the provider the fuel consumption of the Stemac ge-set (ref 31). Thus the updated RMP (ref 1d) consider the following information that was duly validated.</p>	Location	Brand	Model	Installed capacity		Yield		Serial number	Ref.	Lt/hour	Assessment	La Confluencia power house	Stemac generator sets	PA1888	1022585	Ref. 13, pic 1.4	188.7	Pending assessment	Portillo intake	FG Wilson Ltd	P150E2	FGWPEP10AGRB00981	Ref. 13, pic 1.1	31.2	As perf ref. 24 PP is requested to revise the value.	Tinguiririca intake	FG Wilson Ltd	P150E2	FGWPEP10LGRB00982	Ref. 13, pic 1.3	31.2	As perf ref. 24 PP is requested to revise the value.	Azufre intake	FG Wilson Ltd	P150E2	FGWPEP10LGRB00979	Ref. 13, pic 1.2	31.2	As perf ref. 24 PP is requested to revise the value.	Mobile gen set	Olympian	GEP22-4	OLY00000KD4J04648	Ref. 58, pic 37	14	Ok, ref 23	
Location	Brand	Model	Installed capacity				Yield																																											
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La Confluencia power house	Stemac generator sets	PA1888	1022585	Ref. 13, pic 1.4	188.7	Pending assessment																																												
Portillo intake	FG Wilson Ltd	P150E2	FGWPEP10AGRB00981	Ref. 13, pic 1.1	31.2	As perf ref. 24 PP is requested to revise the value.																																												
Tinguiririca intake	FG Wilson Ltd	P150E2	FGWPEP10LGRB00982	Ref. 13, pic 1.3	31.2	As perf ref. 24 PP is requested to revise the value.																																												
Azufre intake	FG Wilson Ltd	P150E2	FGWPEP10LGRB00979	Ref. 13, pic 1.2	31.2	As perf ref. 24 PP is requested to revise the value.																																												
Mobile gen set	Olympian	GEP22-4	OLY00000KD4J04648	Ref. 58, pic 37	14	Ok, ref 23																																												

Checklist Question	Reference	MoV*	Comments						Conclusion/ CARs/CLs	
			Location	Brand	Model	Installed capacity		Yield		
						Serial number	Ref.	Lt/hour	SGS Assessment	
			La Confluencia power house	Stemac generator sets	PA1888	1022585	Ref. 13, pic 1.4	188.7	Ok, ref 31	
			Portillo intake	FG Wilson Ltd	P150E2	FGWPEP10AGRB 00981	Ref. 13, pic 1.1	33.2	Ok, ref 24	
			Tinguiririca intake	FG Wilson Ltd	P150E2	FGWPEP10LGRB0 0982	Ref. 13, pic 1.3	33.2	Ok, ref 24	
			Azufre intake	FG Wilson Ltd	P150E2	FGWPEP10LGRB0 0979	Ref. 13, pic 1.2	33.2	Ok, ref 24	
			Mobile gen set	Olympian	GEP22-4	OLY00000KD4J04 648	Ref. 58, pic 37	14	Ok, ref 23	
			CAR 3, item 3 was closed.							
<p>$T_{\text{gen-set},i,y}$: In order to calculate the fuel consumption the operation hours will be used. As per section B.7.1 (ref 1a), the parameter will be recorded monthly and will be obtained from the generator hour meter. During the site visit, it was verified that every generator keeps a record of the operation hours, thus the procedure defined by the PP to gather the information is deemed correct.</p> <p>$EF_{\text{CO}_2,\text{diesel}}$ & NCV_{diesel}: As per section B.7.1. both parameters will be obtained from IPCC, it was verified that the values are correct and correspond to the value at the upper limit of the confidence level. Since the data is gathered from an official source, no QA/QC procedure is needed.</p>										

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
A.2.2. Are the changes in the monitoring plan inline to the applied methodology and tool?	ACM 0002 version 12.1 Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, version 2	DR	As it was stated previously in section A.1.6, the changes can be divided in three parts: 1. Complete the monitoring procedure to obtain EGy based on the set of measurements done by the relevant set of meters. 2. Revise the parameter (TEGy) that was not required as per the methodology. 3. Include the project emissions originated by the diesel consumption in emergency generators and the required parameters for its calculation. The changes introduced to the monitoring plan comply satisfactorily with the ACM0002 version 12.1 and the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", version 2.	Yes
A.2.3. Are the changes affecting the ER calculation (directly/indirectly)?	Revised MP	DR	Yes, the RMP includes as monitoring parameters the diesel consumption (emergency generators), the new calculation will deduct the project emission which were not originally considered in the PDD. This will finally lead to reduce the emission reductions of the project. On the other hand the other changes related with the parameter TEGy do not have impact in the calculation because it is not required for the project by the methodology. Regarding the changes introduced in the monitoring of EGy, they do not affect the ER calculation itself, but affect the steps followed to obtain the parameter.	Yes
A.2.4. Is the information given for each monitoring variable by the presented table sufficient to ensure the verification of a proper implementation of the monitoring plan?	RMP Section B.7	DR	Yes, each parameter counts with all the relevant information for its monitoring.	Yes
A.2.5. Has there been an issuance with the original monitoring plan of the registered PDD in the past? A.2.6. if so how did the identified gaps effect the ER calculations for the monitoring periods in the past?	Project page on UNFCCC website	DR	The project is under the first verification, no CERs have been issued in the past, thus there is not any gap to cover.	Yes
A.2.7. Is the information given for each monitoring variable by the	RMP Section – B.7	DR	Yes, each parameter considers the relevant information for its monitoring. The changes introduced in the monitoring plan do not involve any bias. Additionally it was validated	Yes

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
presented table sufficient to ensure the delivery of high quality data free of potential for biases or intended or unintended changes in data records?			that the changes follow a conservative approach.	
A.2.8. Is the monitoring approach in line with current good practice, i.e. will it deliver data in a reliable and reasonably acceptable accuracy?	RMP Section-B.7	DR	Yes, the revised monitoring plan follows good practices and additionally considers the scenario for new electricity generators that could inject the energy in Tinguririca sub-station. The accuracy of the data is not threatened. For the EGy case all the meters involved have the same accuracy (0.2s), which is the same committed in the registered PDD (ref 1) for normal current values and better for low currents. On the other hand for the project emissions the PP will obtain the operation hours directly from the generator screen, the specific consumption corresponds to the manufacturer data and the rest (emission factor and NCV) will be obtained from official source (IPCCC).	Yes
A.2.9. Are all formulae used to determine project emission clearly indicated and in compliance with the monitoring methodology.	Revised MP Section -B.7	DR	The formulae used are correct against the ACM0002 version 12.1 (ref 3) and the Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version 2 (ref 12).	Yes
A.3. Quality Control (QC) and Quality Assurance (QA) Procedures				
A.3.1. Is the selection of data undergoing quality control and quality assurance procedures complete?	VVM Para. 121	DR	Yes. For EGy as part of the quality control all the electricity meters involved in the monitoring will be verified every two years. The quality procedures for all the parameters included in the revised monitoring plan is deemed correct.	
A.3.2. in case, a revision is proposed, the impact of the revision should be assessed and it not result in reduced level of accuracy and completeness in the monitoring and verification process	EB49, annex 2, para 9		Yes. For EGy as part of the quality control all the electricity meters involved in the monitoring will be verified every two years and all the equipments involved in the measurements will have the same accuracy.	Yes

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
A.3.3. Are quality control procedures and quality assurance procedures sufficiently described to ensure the delivery of high quality data?	VVM Para 121	DR	<p>The revised monitoring plan safeguards the proper operations of all data capture, analysis and compilation systems. As it was indicated above, the monitoring is performed automatically in a transparent and traceable way.</p> <p>Annex 4 (ref 1a) refers briefly to the actions to follow in case that M5 – M6 fail. Please provide a clearer description how the parameter EGpj would be obtained and confirm if M9, M10, M11 & M12 would be used in those calculations.</p> <p>CL 5 was open.</p> <p>PP provided an explanation of the mechanism to obtain EGpj in case of a failure of the meters located in the injection point. It was reviewed and considered suitable, additionally it was validated that the calculation procedure defined by the PP in case of failure of the meters located in the injection point is correct, and define clearly the transmission losses applicable in any case. Finally it was validated that the procedures were duly included in the updated RMP (ref 1d).</p> <p>CL 5 was closed.</p>	Yes
A.3.4. Is it ensured that data will be bound to national or internal reference standards?	VVM Para. 86d	DR	Yes, all the information will be based on measurements, to ensure quality of the measurements all the electricity metering equipment will be verified every two years. Information from third parties will be obtained from local organizations (CDEC-SIC, CNE) or international organizations (IPCC).	Yes
A.4. Operational and Management Structure				
A.4.1. Is the authority and responsibility of project management clearly described?	PDD Section B.7.2 /Annex 4	DR	Yes. The registered PDD, section B.7.1 describes properly the main actions and the responsible person.	Yes
A.4.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	PDD Section B.7.2/Annex 4	DR	Yes. The registered PDD, section B.7.1 describes properly the main actions and the responsible person.	Yes
A.5. Monitoring Plan (Annex 4)				
A.5.1. Does the monitoring plan completely describe all measures to be implemented for	VVM Para. 122b	DR	Yes. The monitoring plan as it is described in section B.7.1 and Annex 4 is deemed complete, it includes all the parameters required by the ACM0002 version 12.1 (ref 3) and the Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"	Yes

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
monitoring all parameter required, including measures to be implemented for ensuring data quality?			version 2 (ref 12). The details were assessed in section A.2.1.	
A.5.2. Does the monitoring plan provide information on monitoring equipment and respective positioning in order to safeguard a proper installation?	VVM Para. 122b	DR	Yes, figure 9 included in section B.7.1 (ref 1a) identify all the meters involved in the project monitoring. It is consistent with the meters identified in parameter EG _{PJ,Y}	Yes
A.5.3. Is there any change proposed in the specifications of the monitoring equipment or their positioning or installation then the impact of the change due to revision should be assessed and it not result in reduced level of accuracy and completeness in the monitoring and verification process	EB49, annex 2, para 9		<p>Yes. The revised monitoring plan propose to include additional electricity meters, thus the project will use the set of meters defined in the registered PDD (ref 1) plus the additional set of meters. The PP commit in the RMP (ref 1a) all meters will have accuracy equal to 0.2s. It was verified against the calibration certificates that meters already installed (M1_{HLC}, M2_{HLC}, M3, M4, M7, M8, M5, M6) are class 0.2s.</p> <p>Thus it was verified that the changes introduced to the parameter EG_y do not reduce the level of accuracy.</p> <p>Regarding the parameters related with the project emissions (due to the emergency generators), they will be obtained using technical specs (specific consumption), hours records (from each generator), and standard values (EF and NCV obtained from IPCC). The parameters do not involve any specific device for its monitoring. It was validated that a conservative approach has been followed for the PP to determine the PE.</p>	Yes
A.5.4. Are procedures identified for calibration of monitoring equipment?	VVM Para. 122a-c	DR	Yes, they were included in the registered PDD. During the site visit and according with the meters certificates (ref 16), the project has two brand of meters "ION" whose provider is Scheneider Electric and "Jemstar" whose provider is Ametek According with the letter issued by Schneider Electric (ref 20), the meters do not need calibration, but it is recommended the verification of the calibration every seven years. Similarly, based on the technical sheet (ref 21) of Ametek, the provider recommends to verify the calibrated accuracy every four years. Thus it was verified that the PP is going beyond the provider recommendation.	Yes
A.5.5. Is there any change proposed in the calibration procedures, if yes then the impact of the change due to revision should not result	EB49, annex 2, para 9		No.	N/A

Checklist Question	Reference	MoV*	Comments	Conclusion/ CARs/CLs
in reduced level of accuracy and completeness in the monitoring and verification process				
A.5.6. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	VVM Para. 122a-c	DR	The revised monitoring plan includes additional details regarding the data collection and handling. The information included is detailed enough and it is deemed suitable.	Yes
A.5.7. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?	VVM Para. 122a-c	DR	Yes, the structure informed in the registered PDD, section B.7.1., considers the review of the information.	Yes

Annex 2: Overview of Findings

Findings Overview Summary

	CARs	CLs	FARs
Total Number raised	4	1	--

Date:	07/12/2011	Raised by:	Assessment Team		
Type:	CAR	Number:	1	Reference:	1 st verification
Lead Assessor Comment:				Date: 07/12/2011	
EGy					
<p>1. As per ACM002 version 12.1, the parameter $EG_{PJ,y} = EG_{facility,y}$ has to be obtained from the project activity site through continuous measurement. As per MR (ref 6a), $EG_{facility,y}$ is calculated using the equation 1 (ref 6a), which is based on continuous measurements, the cited equation is not included in the monitoring plan (PDD section B.7.1, ref 1). Additionally it was found that the information about meters reported in PDD annex 4 (ref 7) is not consistent with the monitoring report (ref 6a), PDD, Annex 4 mentions only M5 while Monitoring Report informs two meters (M5 & M6) that record the net injections of La Confluencia and La Higuera in the connection point.</p> <p>In order to correct the monitoring plan the PP should present a Revised Monitoring Plan for approval.</p> <p>2. PDD, section B.7.1, & Annex 4 (ref 1) and MR (ref 6a) state that as per "Normas Técnicas" the maximum permissible error of the meters is 0.2%. It was verified that as per the local regulation (ref 10, article 4-7), the meters has to be class 2, it means 2% of error. Thus the PDD and MR reports incorrectly the local regulation requirement. Since a RMP has to be presented, this issue has to be corrected.</p>					
CAR 1 was raised.					
Project Participant Response:				Date: 30/01/2012	
<p>1. A revised monitoring plan has been prepared. Please find attached Version 9 of the PDD (5_HLC_PDD_vers_9_2012-01-30_trackchange and 5_HLC_PDD_vers_9_2012-01-30_cleanversion).</p> <p>2. The class mentioned on the nameplate of the measurement equipment refers to the range of input current (Amperes) that are feasible and not, as one might think, to the range of measurement accuracy.</p> <p>As can be seen in the "JEMSTAR, User Manual" on page 8 under "Range limits and chargeability of the inputs", the normal operation of a CLASS 2 equipment is in the range of 0.0008 – 2 A and maximum allowed (temporary overcharge) current is 3.0 A.</p> <p>On the other hand page 10 shows that for a CLASS 2 (input current) JEMSTAR equipment, the accuracy of the energy measurement (Watt-hours) depends on the input current level. The accuracy is 0.2% or below for currents from 0.025 A up to 2 A., Only in cases of extremely low current values, below 0.025 A, can the accuracy reach values of 0.3%, yet not higher than that.</p> <p>The standard definition of accuracy class for this equipment can be found in page 23 of the User Manual, under the topic "Normalization and Crediting Agencies". Here is stated that the equipment: "is tested and certified to fulfill and exceed the Norm IEC 687, which accuracy is conceived for the accuracy class 0.2. (Specifically section 4.4.4. "Influence & autoheating" and 4.6 "metering accuracy requirement").</p>					
Documentation Provided as Evidence by Project Participant:					
JEM STAR Spanish1.pdf					
Information Verified by Lead Assessor:					
- JEM STAR Spanish.pdf (ref 10)					
Reasoning for not Acceptance or Acceptance and Close Out:					

1. The procedure A&B and its corresponding equations are deemed correct, because they allow to obtain the value of $EG_{\text{facility},y}$ at the injection point (Tinguiririca substation) to the grid. It was validated that the procedure proposed by the PP allows deducting the energy generated by La Higuera power plant and by the new power plants (San Andres and El Paso). Additionally it is considered suitable, because if finally the new plant do not use the transmission lines available, the monitoring plan still will be useful. **Closed.**
2. The explanation provided and the supporting information is correct, but please note that the local regulation (ref 10) requires only 2% error no 0.2%. Please revise. **Remains open.**
3. Regarding monitoring conditions, the methodology requires "*continuous measurement and at least monthly recording*", please note for each meter the RMP states "hourly measurement and monthly recording". Please correct the text. **Open.**
4. Please provide the maintenance procedure that will be applied for the meters related with Hidroelectrica La Confluencia. **Open.**

CAR 1 remains open

Acceptance and Close out by Lead Assessor:

Date: 02/03/2012

Project Participant Response:

Date: 05/04/2012

2.- The local regulation regarding accuracy of energy metering equipment is established by the CDEC in the "Manual of Procedures for Metering systems and supervision systems in the CDEC-SIC" from July 2000 (please see attached file named "Manual de Procedimientos para los Sistemas de Medición y Sistemas de Supervisión en el CDEC-SIC".doc). The document clearly states in Title IV, Article 6: "The accuracy class required for equipment to the measurement of active and reactive energy, is indicated in the following table: Meters: 0.2s (according to norm IEC 687).

On the other hand, CDEC also established rules for other type of equipment. In the "Technical Norms for Security and Quality of Services" in Chapter 4, establishes the minimum requirements for Information Systems and Communications, and in particular in section 4-7, mentions that an accuracy of only 2% error is required on equipment of data acquisition. This is valid for equipment used for SCADA and other real time information purposes, yet not applicable for metering for billing purposes (Given the high amount of money involved in energy transactions, a 2% error is unacceptable).

The Monitoring Plan will be adapted to correct the information, given that it is not the Technical Norm, yet the "Manual of Procedures for Metering systems and supervision systems in the CDEC-SIC", that establishes the local regulation for the accuracy class of energy metering equipment.

According to that described in paragraph above, in the Monitoring Plan the PP will appoint mentioning the "Manual of Procedures for Metering systems and supervision systems in the CDEC-SIC" as a reference for the Accuracy Class of meter.

Nevertheless is worth to mention that the Project by using class 0.2 accuracy in their metering equipment has been complying with the local regulation, so being conservative comparing with any other higher class requirement.

3.- The text was corrected in RMP

4.- Please fin attached the "Maintenance and Verification of Electronic Meters".

Documentation Provided as Evidence by Project Participant:

- Maintenance and Verification of Electronic Meters. doc
- RMP_2012-04-03_track changes.doc
- "Manual de Procedimientos para los Sistemas de Medición y Sistemas de Supervisión en el CDEC-SIC".doc

Information Verified by Lead Assessor:

- RMP 2012_05_03.doc (ref 1b)
- Manual de Procedimientos para los Sistemas de Medición y Sistemas de Supervisión en el CDEC-SIC.doc (ref 27)
- Maintenance and Verification of Meters.doc (ref 28)

Reasoning for not Acceptance or Acceptance and Close Out:

2. It was validated that RMP corrected the information regarding the accuracy class required by the Technical norm (ref 10). At the same time it was validated that the information was completed according with the Manual of Procedures for Metering Systems (ref 28). The information is deemed correct and the energy meters comply with the regulation. **Closed.**

3. It was validated that the measuring frequency defined for each meter is correct against the ACM0002 version 12.1 requirement. **Closed.**

4. It was validated that the PP has defined a procedure to verify the correct operation of the energy meters. The verification frequency of the meters is consistent with the one committed in the RMP (ref 1b). **Closed.**

CAR 1 closed.

Re-opened on 16/04/2012 after TR stage.

5. Page 9 of RMP, it is stated that all the meters will have the accuracy class of 0.2 while in page 2, it states that the CDEC-SIC requires the meters to be 0.2S. Please clarify. **Item open.**

6. Please clarify if the meters involved are bidirectional, thus they record the net electricity flow. Please provide the supporting evidence. **Item open.**

7. Please clarify why the procedure A&B defined in the previous RMP version (ref 1c) received on 09/04/2012 includes equation 1 & 2 that later were deleted in next version of RMP (ref 1d). **Item open.**

CAR 1 was re-opened.

Acceptance and Close out by Lead Assessor:	Date: 16/04/2012
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Project Participant Response:	Date: 16/04/2012
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5.- Accuracy class 0.2 and 0.2s are similar and both refer to an +/- 0.2% error in the measurement at values next to rated current.

The "s" refers to special features (Special), ie measuring between 1% and 120% of rated low class.

The difference between both accuracy classes only arises at low current levels, where accuracy class 0.2 s is more accurate than accuracy class 0.2. While both have maximum errors of +/- 0.2% at 100% and 120% of rated current, class 0.2s allows +/- 0.75% error at 1% of rated current, +/- 0.35% error at 5% of rated current and +/- 0.2% error at 20 % of rated current, while accuracy class 0.2 has +/-0.75% error at 5% of rated current and +/- 0.35% error at 20% of rated current. (Please see attached document " IEC62053-22).

6.- All energy meters (ION and JEMSTAR) used for CDM purposes are bidirectional. These meters are: M1, M2, M3, M4, M5, M6, M7 and M8. Please refer to documents "Entienda y controle su energía con PowerLogic" and "JEM STAR Spanish".

The meters M9, M10, M11 and M12 which will be installed once one of the external power plants start operation and inject electricity into the La Confluencia substation, also be bidirectional

7.- Procedures A and B mentioned in the RMP submitted on 07/04/2012 were correct. In the RMP version submitted on 09/04/12 they were deleted by mistake. The RMP has now been corrected and both procedures are again part of the text. Please see the updated RMP 17_04_2012.

Information Verified by Lead Assessor:

- "IEC62053-22".pdf
- "Entienda y controle su energía con PowerLogic".pdf
- "JEM STAR Spanish".pdf.
- RMP 17_04_2012.doc

Information Verified by Lead Assessor:

Ref. 32 - cei62053-22{ed1.0}s.pdf (ref 32)

Ref. 33 - Entienda y controle su energía con PowerLogic.pdf (ref 33)

Ref. 34 - JEM STAR spanish.pdf (ref 34)

Reasoning for not Acceptance or Acceptance and Close Out:

5. Meters used by the PP comply with the technical standard requirement, basically the difference between meters falls on “ s” meters are more accurate at low currents. Thus, 0.2s meters behave better than other ones, which clearly complies with the standard requirement. **Item closed.**

6. It was validated against the meters catalogue (Schneider & Jemstar, ref 33&34 respectively) that meters M1, M2, M3, M4, M5, M6, M7 and M8 are bidirectional, it means from the them net records are obtained.

Similarly RMP (ref 1e) states that all measurement done by the meters are “net”. **Item closed.**

7. It was validated that updated RMP (ref 1e) included again the paragraph that were accidentally deleted. The RMP provides separated procedures to apply in normal conditions (equations 1 & 2) and in case of M5+M6 failure (equations 3, 4 &5). **Item closed.**

Re – assessment 22/04/2012 (after TR review).

5. Considering that the “Manual de Procedimientos para los Sistemas de Medición y Sistemas de Supervisión en el CDEC-SIC” (Manual of Procedures for Metering systems and supervision systems in the CDEC-SIC) (ref 27) is the regulation that has to be complied. Please clarify if the installed meters are class 0.2 or 0.2s and if the new meters (in La Confluencia sub-station) will be class 0.2 or 0.2s. Please correct the RMP if necessary.

Item re-opened.

CAR 1 remains open.

CAR 1 was closed.

Acceptance and Close out by Lead Assessor:	Date: 22/04/2012
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Project Participant Response:	Date: 23/04/2012
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Accuracy class of all meters (M1_{HLC}, M2_{HLC} and M3 to M12) will be 0.2s. This was corrected in the RMP_23_04_2012.

Please see section B.7.2 of the RMP_23_04_2012

Documentation Provided as Evidence by Project Participant:

RMP_23_04_2012.doc

Information Verified by Lead Assessor:

- RMP_23_04_2012.doc (ref 1f)

Reasoning for not Acceptance or Acceptance and Close Out:

It was validated that PP corrected the RMP (ref 1f) and states that meters are class 0.2s. It was validated that as per the catalogue of the meters already installed (ref. 11 (Jemstar), ref 33 (Ion)), they comply with IEC 687 (ie. Class 0.2s). **Item closed.**

CAR 1 was closed.

Acceptance and Close out by Lead Assessor:	Date: 23/04/2012
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Date:	07/12/2011	Raised by:	Assessment Team		
Type:	CAR	Number:	2	Reference:	1 st verification
Lead Assessor Comment:		Date: 07/12/2011			
<p>Monitored Parameters – MR</p> <p>- The MR (ref 6a) only reports the parameter EG_{facility.y}, but it is not reported the parameter TEGy, which is defined as a monitored parameter in PDD section B.7.1. (ref 7). The PP is requested to complete the information.</p> <p>CAR 2 was raised.</p>					
Project Participant Response:		Date: 30/01/2012			
<p>- In line with the revision of the monitoring plan mentioned in the previous CAR, the parameter TEGy was excluded from the monitoring plan. According to the methodology "Approved consolidated baseline and monitoring methodology ACM0002", version 12.1, the parameter TEGy is applicable to hydro power project activities with a power density of the project activity (PD) greater than 4 W/m² and less than or equal to 10 W/m²</p> <p>The installed capacity of the project activity gives a calculated power density of 1,161.6 W/m², based on the surface area of the reservoir (as checked in Validation report, page 47), which is greater than 4 W/m² and 10 W/m². Therefore, this parameter will be not monitored during the project activity.</p>					
Documentation Provided as Evidence by Project Participant:					
Please see MR section E.4.					
Information Verified by Lead Assessor:					
- 1st MR HLC 30-01-2012_track change.doc (ref 6b)					
Reasoning for not Acceptance or Acceptance and Close Out:					
<p>It was verified that updated MR (ref 6b) does not include the parameter TEGy, this is correct for those projects whose power density is higher than 10 W/m². As per validation report (ref 2) the power density is 1,161.6 W/m². During the site visit, it was validated that the installed capacity of the project is 163.22 MW (ref 13, pics 2.1 & 2.2), then in order to re-validate the power density, please provide the area of the accumulation pond (based on its full capacity). Open.</p> <p>CAR 2 remains open</p>					
Acceptance and Close out by Lead Assessor:		Date: 02/03/2012			
Project Participant Response:		Date: 05/04/2012			
<p>The power density of HLC is 1,161.6 W/m², which is obtained by dividing the installed capacity of 163,220,000 W by the area of the accumulation pond (at full capacity), which is 140,512 m².</p> <p>In order to review the total pond area at full capacity, please find attached draw CI-31-C-D-05.0008-RB of La Confluencia Pond.</p>					
Documentation Provided as Evidence by Project Participant:					
<ul style="list-style-type: none"> CI-31-C-D-05.0008-RB.pdf 					
Information Verified by Lead Assessor:					
- CI-31-C-D-05.0008-RB.pdf (ref 29)					
Reasoning for not Acceptance or Acceptance and Close Out:					
<p>It was validated against the accumulation tank design sheet (ref 29) that the inundated area is 140,512 m². Thus the power density is 1,161 W/m², then the project does not have to monitor the parameter TEGy and was correctly deleted from the monitoring plan.</p> <p>CAR 2 closed.</p>					
Acceptance and Close out by Lead Assessor:		Date: 05/04/2012			

Date:	16/12/2011	Raised by:	Assessment Team		
Type:	CAR	Number:	3	Reference:	Site visit
Lead Assessor Comment:		Date: 16/12/2011			

Project emissions/project boundaries

During the site visit it was found that the La Confluencia has 4 diesel emergency generators. The project emissions originated by the diesel engine consumption were not included in the registered PDD (ref 7). The generators located in Portillo and Azufre intake do not record operation hours, they are without use because still the cited intakes are not operative. The generator located in the Power house and Tinguiririca intake recorded 61 hrs and 79.2 hrs operation hours respectively.

Please provide all the information regarding the generators and consider its emissions in the Monitoring Plan.

CAR 3 was raised.

Project Participant Response:

Date: 30/01/2012

The monitoring plan in the PDD has been updated accordingly, considering the following information:

The La Confluencia Project has 4 generators, of which two, the one at the Portillo intake and the one at Azufre intake, have not yet been operated since the intakes are still under construction.

Additionally, there is one mobile emergency gen-set that can be used by the La Confluencia Project, which is stored at the Los Helados Intake Center of the La Higuera hydro power plant.

The diesel gen-set at the powerhouse is a backup system, which will provide electricity to the essential consumption and auxiliary services. It will only operate in case the power system is undergoing maintenance and in case energy from the SIC (grid) is not available. Additionally, the gen-set can provide enough energy for a black start of one unit allowing the start-up of the other one, and then recover the sub-system. This capability is called autonomous start-up. It is expected that both cases are going to occur in very specific situations and only sporadic, since maintenance is carefully scheduled in advance and the external grid is very stable; hence black starts (after a black out) are uncommon.

The diesel generators at the intakes are backup generators in case there are flaws in the power supply to the intakes. The intakes will be connected to a medium voltage line to supply the energy needed for the gate.

The mobile gen-set will be used by both HLC and HLH, but for conservativeness 100% of the GHG emissions from this gen-set will be accounted in both projects.

The emissions generated by the diesel generators, if any, will be included in the monitoring report of the corresponding monitoring period. The generators at the powerhouse and the Tinguiririca intake have recorded 57.20 and 58.07 hours, respectively, until to September 2011.

It is a normal practice of O&M team to have records of maintenance and operation of all plant equipment including the gen-sets.

The features of each gen-set are:

Name	Manufacturer	Model	Serial number	Location	Power Stand-by	Power factor	Voltage	Frequency	RPM
Mobile emergency gen-set	Olympian	GEP22-4	OLY00000KD4J04648	Los Helados Intake Center	22kVA	0.8	380/220V	50 Hz	1500 rpm
Main emergency gen-set	Stemac generators sets	PA1888	1022585	Confluencia Power House	954kVA	0.8	400V	50 Hz	1500 rpm
emergency gen-set	FG Wilson Ltd	P150E2	FGWPEP10AGRB00981	Tinguiririca Intake Center	150kVA	0.8	380/220V	50 Hz	1500 rpm
emergency gen-set	FG Wilson Ltd	P150E2	FGWPEP10LGRB00982	Portillo Intake Center	150kVA	0.8	380/220V	50 Hz	1500 rpm
emergency gen-set	FG Wilson Ltd	P150E2	FGWPEP10LGRB00979	Azufre Intake Center	150kVA	0.8	380/220V	50 Hz	1500 rpm

Please find complete list attached and estimated emission calculation from operation in the monitoring report.

Documentation Provided as Evidence by Project Participant:

- Updated Monitoring Plan and Monitoring Report.
- Emission of gen_set HLC.xls
- Grupos diesel de emergencia CLH - CLC.xlsx

Information Verified by Lead Assessor:

- Emission of gen_set HLC.xls (ref 8) - Grupos diesel de emergencia CLH – CLC.xls (ref 9)	
Reasoning for not Acceptance or Acceptance and Close Out:	
1. In section B.7.2. is mentioned the applicable methodology, please add the version of the meth. Additionally since the project will account now its emissions by fossil fuel consumption, please include the relevant Tool and its version. Open. 2. As per ACM0002 version 12.1, the parameter $PE_{FF,y}$ has to be included for project that consume fossil fuel. Please include this parameter in section B.7.1.. Open. 3. Please revise the specific consumption of the generator FG Wilson P150 E2, it is not consistent against the technical sheet of the equipment (ref 24). Please provide the technical specs of the generator Stemac PA1888. Open. 4. Please revise the identification of the generator reported in PDD section B.7.1. and annex 4 and the table provided in this finding. Information is not consistent. Open.	
CAR 3 remains open.	
Acceptance and Close out by Lead Assessor:	Date: 28/03/2012
Project Participant Response:	Date: 05/04/2012
<p>1.- It was included the version of the methodology ACM0002 version 12.1 in Section B.7.2 of the PDD and the "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" Version 2"</p> <p>ACM0002, version 12.1, does not require the calculation of project emissions in case of hydro power projects. However, for reasons of conservativeness, project emissions from gen-sets that will be operated in case of grid failures are taken into consideration as follows:</p> <p>The gen-sets will not supply power to the grid, but used only in emergencies. It is estimated that their emissions in normal operation of the power plant will be well below 1% of the average emission reduction of the project activity. Nevertheless, La Confluencia will use the hour meters of the gen-sets to monitor the use of the engines. Related emissions will be considered in the monitoring reports.</p> <p>Emissions of each gen-set is obtained based on metering of the operating hours through the calculation of diesel consumption, the net calorific value (NCV) and the emission factor of the diesel. The default values of NCV and emission factor of diesel will be derived from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, upper value at 95% confidence level.</p> $PE_{gen-set} = \sum FC_{gen-set\ i,y} * NCV * EFCO_{2,diesel}$ <p>Where:</p> <p>$FC_{gen-set,i}$: Diesel consumption of gen-set i NCV: Net Calorific Value of diesel (default value of 43.4 TJ/Gg IPCC, upper value at 95% confidence level) $EFCO_{2,diesel}$: Diesel emission factor, (default value of 74.8 tCO₂/TJ of IPCC, i.e. upper value at 95% confidence level)</p> <p>Where the fuel consumption is calculated as</p> $FC_{gen-set\ i,y} = \text{Hours of operation of gen-set i in year y} * \text{specific diesel consumption at full load of gen-set i}$ <p>In case of a failure of the hour meters and/or in the absence of sufficient data recording it is assumed for such periods that the gen-sets have been operated continuously at full load - as a conservative approach - but capped to the maximum possible operating hours according to available and proper meter readings.</p> <p>2.- According to the methodology ACM0002, the parameter $PE_{FF,y}$ is applicable to geothermal and solar thermal projects, which also use fossil fuels for electricity generation. However, with the parameters $FC_{gen-set,i,y}$, $T_{gen-set,i,y}$, $EF_{CO_2,diesel}$, and NCV_{diesel} described in Section B.7.1 of the HLC PDD v.10 the PP calculates the CO₂ emissions of the project.</p> <p>3.- According to the technical specifications the fuel consumption is 30.7 l/hr (100% Load). Please find attached the technical specifications "FG Wilson P150-2". Please find attached technical specs of the generator Stemac PA1888 (UAP.D5510.1D3.74928.1)</p> <p>4.- Data reported in PDD section B.7.1 and in Annex 4 was corrected</p>	

Documentation Provided as Evidence by Project Participant:	
<i>"HLC_PDD_vers_10_2012-04-03_track changes".doc</i> <i>"FG Wilson P150-2".pdf</i> <i>Spreadsheet "Emission of gen_set HLC".xls</i> <i>"UAP.D5510.1D3.74928.1".rar</i>	
Information Verified by Lead Assessor:	
- RMP 2012_05_03.doc (ref 1b) - Emission of gen_set HLC.xls (ref 8b) - AP.D5510.1D3.74928.1.rar (ref 30)	
Reasoning for not Acceptance or Acceptance and Close Out:	
1. It was validated that in the RMP (ref 1b), section B.7.2. it was included the version of the meth and the Tool (ref 12). Closed. 2. The PP did not include the parameter $PE_{FF,y}$ in the RMP, the explanation is acceptable considering that the RMP includes all the parameters to calculate the emissions due to diesel consumption by the emergency generators. Closed. 3. Based on the list of diesel emergency generators (ref 9), the FG Wilson equipments have a power stand by equivalent to 150 kVA, then as per the technical sheet (ref 24) the consumption is equal to 33.2 Lt/hour. Please correct. Item remains open. 4. The updated RMP (ref 1b) was reviewed, please note that serial number of the generators located in Tinguiririca and Portillo intake are not consistent between info reported in B.7.1. and annex 4. Please revise. Item remains open.	
CAR 3 remains open.	
Acceptance and Close out by Lead Assessor:	Date: 05/04/2012
Project Participant Response:	Date: 07/04/2012
3. <i>It was corrected the fuel consumption of FG Wilson 150kVA generators. Please see the spreadsheet "Emission of gen_set HLC"</i> 4. <i>It was corrected the serial number of the generators located in Tinguiririca and Portillo intake in B.7.1. and annex 4. Please see the RMP 2012 07 03.</i>	
Documentation Provided as Evidence by Project Participant:	
<ul style="list-style-type: none"> <i>"Emission of gen_set HLC".xls</i> <i>"RMP 2012_07_03".doc</i> 	
Information Verified by Lead Assessor:	
- RMP 2012_07_03.doc (ref 1c) - Emission of gen_set HLC.xls (ref 8c)	
Reasoning for not Acceptance or Acceptance and Close Out:	
3. It was validated that the fuel consumption of the devices was corrected as per the information reported in the technical sheet of the generator (ref 24), thus the RMP includes the correct information and the calculation of the emissions by the diesel consumption is correct. Item Closed. 4. It was validated that the serial number of the generators was corrected and it is consistent in the RMP. It is important to highlight that the generators installed in Tinguiririca, Portillo and Azufre intakes are equivalent among them, the equipments have the same technical characteristics. Item closed.	
CAR 3 was closed.	
Re-opened after TR stage 16/04/2012	
5. As per the RMP, section B.7.1., NCV_{diesel} and EF_{diesel} , will be obtained from IPCC 2006. How will be taken into account future revisions of IPCC guidelines?. Item open. 6. Please clarify if Los Humos, Riquelme, La Gloria and Ciruelo intakes will have in future an emergency generator. If this is the case how this emission will be accounted? Item open. 7. During the site visit, SGS team was informed that in future the intakes (Portillo) will be energized from the net. Please clarify if this mechanism will be applied to every intake. Item open.	
CAR 3 was re-opened.	
Acceptance and Close out by Lead Assessor:	Date: 16/04/2012
Project Participant Response:	Date: 16/04/2012

5.- Parameters NCV_{diesel} and EF_{diesel} mentioned in section B.7.1 of the RMP will always be obtained from the latest version of the IPCC guideline. Hence RMP text has been modified accordingly. Please see " RMP 17/04/2012" .

6.- Los Humos, Riquelme, La Gloria and Ciruelo intakes do not have nor consider to have in the future diesel generators installed on site. In case there is a need of this kind of equipment, there is a mobile genset available (located at Los Helados intake from " La Higuera Project ") that could be used, and which emissions are already being monitored for this project. (Please refer to RMP in Annex 4)
In case a new genset would be installed in the future at any intake, emissions will be accounted for in the same way as the existing gensets and reported accordingly.

7.- Each of the 7 intakes of La Confluencia project consider connection to the medium voltage grid (13.8 kV).

Documentation Provided as Evidence by Project Participant:

- RMP 17/04/2012".doc

Information Verified by Lead Assessor:

- RMP 17_04_2012.doc (ref 1e)

Reasoning for not Acceptance or Acceptance and Close Out:

5. It was validated that RMP (ref 1e) consider future updates of IPCC guidelines as information source for NCV and EF. **Item closed.**

6. PP confirmed that Los Humos, Riquelme, La Gloria and Ciruelo are not going to have emergency generators and the could be served with the mobile generator. During the site visit and as it is reported in the RMP (ref 1e) the project has a mobile generator that is transported where is required. The emissions from this device are already included in the RMP. **Item closed.**

7. PP confirmed that every intake will be connected to an energized line, thus they can operate with energy from the net in case of emergency as well. This energy is accounted by the meters. **Item closed.**

CAR 3 was closed.

Acceptance and Close out by Lead Assessor:

Date: 17/04/2012

Date:	28/02/2012	Raised by:	Assessment Team		
Type:	CAR	Number:	4	Reference:	RMP assessment
Lead Assessor Comment:					
RMP To present a request for approval of the RMP, the sections of PDD that have to be provided are: B.7.1, B.7.2 and Annex4. Please provide the RMP in track changes considering only the mentioned section and include at the beginning of the document project name, UN project number version and date of the RMP.					
CAR 4 was open.					
Project Participant Response:				Date: 05/04/2012	
Please find attached RMP_2012-04-03_ with track of changes considering only sections B.7.1, B.7.2 and Annex 4 of the PDD.					
Documentation Provided by Project Participant:					
<ul style="list-style-type: none">• "RMP_2012-04-03_track changes".doc					
Information Verified by Lead Assessor:					
- RMP 2012_05_03.doc (ref 1b)					
Reasoning for not Acceptance or Acceptance and Close Out:				Date: 05/04/2012	
The updated RMP (ref 1b) includes only the relevant sections (B.7 and annex 4).					
CAR 4 was closed.					
Acceptance and Close out by Lead Assessor:				Date: 05/04/2012	

Date:	29/03/2012			Raised by:	Assessment Team	
Type:	CL	Number:	5	Reference:	RMP assessment	
Lead Assessor Comment:						

RMP – fails of meter located in Tinguiririca sub-station

Annex 4 refers briefly to the actions to follow in case that M5 – M6 fail. Please provide a clearer description how the parameter EGpj would be obtained and confirm if M9, M10, M11 & M12 would be used in those calculations.

CL 5 was open.

Project Participant Response:

Date: 05/04/2012

As outlined in Annex 4 (Please see attached Annex 4 in the RMP), in case of emergencies and/or faulty meters, corresponding corrective actions will take place by restoring and/or replacing erroneous measurements with data not affected, i.e. in the unlikely case meter M5 and M6 accounting the net generation will fail data from meters M3, M4, M7 and M8 or from M1_{HLC} and M2_{HLC} could be used to estimate the net electricity fed into the grid. If the restoring of data will not be possible, erroneous measurements will not be considered for calculating CERs.

In case of any failure on the data recording of Tinguiririca substation electricity meters (owned by Transelec) the generation data of the project at the injection point (M5+M6) should be obtained by using the electricity measured at La Higuera substation with meters M7 + M8 (as in Figure 9 of the MP) and deducting the typical average value of transmission losses between La Higuera substation and Tinguiririca substation. The typical average value for transmission losses will be obtained based on previous records of the measurements at Tinguiririca substation and La Higuera substation, as described under the response to CAR1 (dated 30/01/2012) in CDM.VER1280 MP1.

The calculation of net energy generation of La Confluencia assumes the proportional distribution of transmission losses between La Higuera and La Confluencia hydropower plants, in function of the hourly energy injected by each plant to La Higuera substation. The calculation method for the transmission losses under Monitoring procedure A (i.e. before the start of operation of external power plants) is presented in the response to CAR1 in CDM.VER1280 MP1.

Under Monitoring procedure B, after the introduction of energy from external power plants, the 18 km transmission line, between La Confluencia will be shared with those plants, and losses along this line are distributed proportionately between the users in function of the hourly energy injected by each power plant, Please see determination of transmission losses under Monitoring procedure B (i.e. after the start of operation of external power plants) in response to CAR1 in CDM.VER1280 MP1. Under Monitoring procedure B meters M9, M10, M11 & M12 would be used.

Documentation Provided by Project Participant:

- RMP_2012-04-03.doc

Information Verified by Lead Assessor:

- RMP 2012_05_03.doc (ref 1b)

Reasoning for not Acceptance or Acceptance and Close Out:

Date: 09/04/2012

In general terms the action seems to be consequent with the proposed monitoring technology; however, in the case of procedure B is not clear how the losses sharing is going to be determined not only for the line between La Confluencia and la Higuera but also for the line La Higuera- Tinguirica. Please provide more detail regarding this issue and include in RMP a description of the actions in case of meters failure (for A and B).

CL 5 remains open.

Acceptance and Close out by Lead Assessor:

Date: 09/04/2012

Project Participant Response:

Date: 10/04/2012

In case of emergencies and/or faulty meters, corresponding corrective actions will take place by restoring and/or replacing erroneous measurements with data not affected, i.e. in the unlikely case meter M5 and M6 accounting the net generation will fail data from meters M3, M4, M7 and M8 or from M1_{HLC} and M2_{HLC} could be used to estimate the net electricity fed into the grid. If the restoring of data will not be possible, erroneous measurements will not be considered for calculating CERs.

In case of any failure on the data recording of Tinguiririca substation electricity meters (owned by Transelec) the generation data of the project at the injection point (M5+M6) should be obtained by using the electricity measured at La Higuera substation with meters M7 + M8 (as in Figure 9 of the MP) and deducting the typical average value of transmission losses between La Higuera substation and Tinguiririca substation. The typical average value for transmission losses will be obtained based on previous records of the measurements at Tinguiririca substation and La Higuera substation, as follows:

Transmission loss factor

Determination of the transmission losses going through the 38 km transmission line linking La Higuera substation with Tinguiririca substation:

$$t_{HLC,avg} = AVG \left\{ \frac{(M3 + M4) + (M7 + M8) - (M5 + M6)}{(M3 + M4) + (M7 + M8)} \right\} \quad (1)$$

This average historical transmission loss factor represents the transmission losses as a share of energy injected in La Higuera substation.

Monitoring procedure A (i.e. before the start of operation of external power plants):

The equation (1) can be transposed to estimate EG_{pj} in case M5 and M6 fail by using the average historical transmission losses and the result of the remaining meters, as follows:

$$EG_{facility,y} = (M7 + M8) \cdot (1 - t_{HLC,avg}) \quad (2)$$

By applying the average historical transmission losses factor to the meters M7 and M8 related to La Confluencia, a proportional distribution of transmission losses between La Higuera and La Confluencia hydropowerplants is assumed.

Monitoring procedure B (i.e. after the start of operation of external power plants):

The equation 1B can be transposed to estimate EG_{pj} in case M5 and M6 fail by using the average historical transmission losses and the result of the remaining meters, as follows:

$$EG_{facility,y} = (M7 + M8) \cdot \frac{(M9 + M10)}{(M9 + M10) + (M11 + M12)} \cdot (1 - t_{HLC,avg}) \quad (3)$$

For Monitoring Procedure A & B, the calculation of net energy generation of La Confluencia assumes the proportional distribution of transmission losses between all hydropower plants involved, in function of the hourly energy injected by each plant to La Higuera substation.

Documentation Provided as Evidence by Project Participant:

- RMP 2012_10_04.doc

Information Verified by Lead Assessor:

- RMP 2012_10_04.doc (ref 1d)

Reasoning for not Acceptance or Acceptance and Close Out:

It was validated that the calculation procedure defined by the PP in case of failure of the meters located in the injection point is correct, and define clearly the transmission losses applicable in any case. Finally it was validated that the procedures were duly included in the updated RMP (ref 1d).

CL 5 was closed.

CL 5 was re-opened on 16/04/2012 after TR stage

- Please note that Monitoring procedure A&B mix the normal procedure with the action to follow in case of lack of information (M5+M6). Please clarify if the procedure cited (equation 2 & 3, RMP ref 1d) applies only in emergencies and/or faulty meters or in any case. Please see as well the comment number 7 raised in CAR 1. **Item open.**
- Please define the range of historical information that will be used to defined the historical losses in cases on M5+M6 failure. **Item open.**
- Please note that RMP page 9 mentions equation 1b, but this does not exist in the document. Please revise. **Item open.**

CL 5 remains open.

Acceptance and Close out by Lead Assessor:	Date: 16/04/2012
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Project Participant Response:	Date: 16/04/2012
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- *Procedures A and B mentioned in the RMP submitted on 07/04/2012 referring to the normal procedure with the action to follow in case of lack of information were correct. In the RMP version submitted on 09/04/12 these procedures were deleted by mistake. The RMP has now been corrected and both procedures are again part of the text. Please see the updated RMP 16_04_2012.*

*The equations 2 & 3 of RMP submitted on 10/04/12 apply only in emergencies and/or faulty meters.
(Please see as well answer to comment number 7 in CAR 1)*

- The average historical loss factor will be calculated over the latest available 2-year period.
- Equation 1b mentioned in RMP page 9 submitted on 10/04/12, was not correctly listed. The text refers to equation 3 and was corrected accordingly. Please see "RMP 17_04_2012".

Documentation Provided as Evidence by Project Participant:

- RMP 17_04_2012.doc

Information Verified by Lead Assessor:

- RMP 17_04_2012.doc (ref 1e)

Reasoning for not Acceptance or Acceptance and Close Out:

- It was validated that updated RMP (ref 1e) includes the normal procedures (A&B) to obtain EGy and the separated procedures to apply in case of failure in the meters located in Tinguiririca sub-station. Thus there is not mix and possibility of misunderstanding of the steps follow in every case. **Item closed.**
- It was validated that PP defined a period of two years to calculate the historical losses and obtain the parameter EGy in case of failure of M5+M6. The period of time is considered enough. **Item closed.**
- It was validated that updated RMP (ref 1e) corrected the equation wrongly named (1b). It corresponds to equation 3 in RMP (ref 1e), it is correct and consistent. **Item closed.**

CL 5 was closed.

Acceptance and Close out by Lead Assessor:	Date: 17/04/2012
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7. Annex 3: Statement of Competence

Statement of Competence

Name: **Alicia Fernandez**

Status

- Lead Assessor	x	- Expert	
- Assessor	x	- Financial Expert	
- Local Assessor	Latin America Excluding Brazil	- Technical Reviewer	x

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)

Technical Area(s):

2. Energy Distribution

Technical Area(s):

3. Energy Demand

Technical Area(s):

4. Manufacturing

Technical Area(s):

5. Chemical Industry

Technical Area(s):

6. Construction

Technical Area(s):

7. Transport

Technical Area(s):

8. Mining/Mineral Production

Technical Area(s):

9. Metal Production

Technical Area(s):

10. Fugitive Emissions from Fuels (solid, oil and gas)

Technical Area(s):

11. Fugitive Emissions from Production and

Consumption of Halocarbons and Sulphur Hexafluoride

Technical Area(s):

12. Solvent Use

Technical Area(s):

13. Waste Handling and Disposal

Technical Area(s):

14. Afforestation and Reforestation

Technical Area(s):

15. Agriculture

Technical Area(s):

Approved Member of Staff by:

**Siddharth
Yadav**

Date:

25/01/2012

Statement of Competence

Name: **Guillermo Jimenez**

Status

- Lead Assessor	<input type="checkbox"/>	- Expert	<input checked="" type="checkbox"/>
- Assessor	<input type="checkbox"/>	- Financial Expert	<input type="checkbox"/>
- Local Assessor	<input type="checkbox"/>	- Technical Reviewer	<input type="checkbox"/>

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	<input checked="" type="checkbox"/>
Technical Area(s): <i>TA 1.2 Energy generation from renewable energy sources</i>	
2. Energy Distribution	<input type="checkbox"/>
Technical Area(s):	
3. Energy Demand	<input type="checkbox"/>
Technical Area(s):	
4. Manufacturing	<input type="checkbox"/>
Technical Area(s):	
5. Chemical Industry	<input type="checkbox"/>
Technical Area(s):	
6. Construction	<input type="checkbox"/>
Technical Area(s):	
7. Transport	<input type="checkbox"/>
Technical Area(s):	
8. Mining/Mineral Production	<input type="checkbox"/>
Technical Area(s):	
9. Metal Production	<input type="checkbox"/>
Technical Area(s):	
10. Fugitive Emissions from Fuels (solid, oil and gas)	<input type="checkbox"/>
Technical Area(s):	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	<input type="checkbox"/>
Technical Area(s):	
12. Solvent Use	<input type="checkbox"/>
Technical Area(s):	
13. Waste Handling and Disposal	<input type="checkbox"/>
Technical Area(s):	
14. Afforestation and Reforestation	<input type="checkbox"/>
Technical Area(s):	
15. Agriculture	<input type="checkbox"/>
Technical Area(s):	

Approved Member of Staff by: **Siddharth Yadav** Date: **06/02/2012**

Statement of Competence

Name: Niclo
Deng

Status

- Lead Assessor	<input type="checkbox"/>	- Expert	<input type="checkbox"/>
- Assessor	<input type="checkbox"/>	- Financial Expert	<input type="checkbox"/>
- Local Assessor	<input type="checkbox"/>	- Technical Reviewer	<input checked="" type="checkbox"/>

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	<input type="checkbox"/>
Technical Area(s):	
2. Energy Distribution	<input type="checkbox"/>
Technical Area(s):	
3. Energy Demand	<input type="checkbox"/>
Technical Area(s):	
4. Manufacturing	<input type="checkbox"/>
Technical Area(s):	
5. Chemical Industry	<input type="checkbox"/>
Technical Area(s):	
6. Construction	<input type="checkbox"/>
Technical Area(s):	
7. Transport	<input type="checkbox"/>
Technical Area(s):	
8. Mining/Mineral Production	<input type="checkbox"/>
Technical Area(s):	
9. Metal Production	<input type="checkbox"/>
Technical Area(s):	
10. Fugitive Emissions from Fuels (solid, oil and gas)	<input type="checkbox"/>
Technical Area(s):	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	<input type="checkbox"/>
Technical Area(s):	
12. Solvent Use	<input type="checkbox"/>
Technical Area(s):	
13. Waste Handling and Disposal	<input type="checkbox"/>
Technical Area(s):	
14. Afforestation and Reforestation	<input type="checkbox"/>
Technical Area(s):	
15. Agriculture	<input type="checkbox"/>
Technical Area(s):	

Approved Member of Staff by: Siddharth Yadav Date: 20/05/2011

Statement of Competence

Name: Yuanny
Li

Status

- Lead Assessor		- Expert	x
- Assessor	x	- Financial Expert	
- Local Assessor	China	- Technical Reviewer	

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	x
Technical Area(s): TA 1.2 Energy generation from renewable energy sources	
2. Energy Distribution	
Technical Area(s):	
3. Energy Demand	
Technical Area(s):	
4. Manufacturing	
Technical Area(s):	
5. Chemical Industry	
Technical Area(s):	
6. Construction	
Technical Area(s):	
7. Transport	
Technical Area(s):	
8. Mining/Mineral Production	
Technical Area(s):	
9. Metal Production	
Technical Area(s):	
10. Fugitive Emissions from Fuels (solid, oil and gas)	
Technical Area(s):	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	
Technical Area(s):	
12. Solvent Use	
Technical Area(s):	
13. Waste Handling and Disposal	
Technical Area(s):	
14. Afforestation and Reforestation	
Technical Area(s):	
15. Agriculture	
Technical Area(s):	

Approved Member of Staff by: Siddharth Yadav Date: 15/02/2012